

**MATERIAL IRRADIATION STUDIES FOR HIGH-
INTENSITY PROTON BEAM TARGETS AT THE
BNL BLIP FACILITY**

STATUS

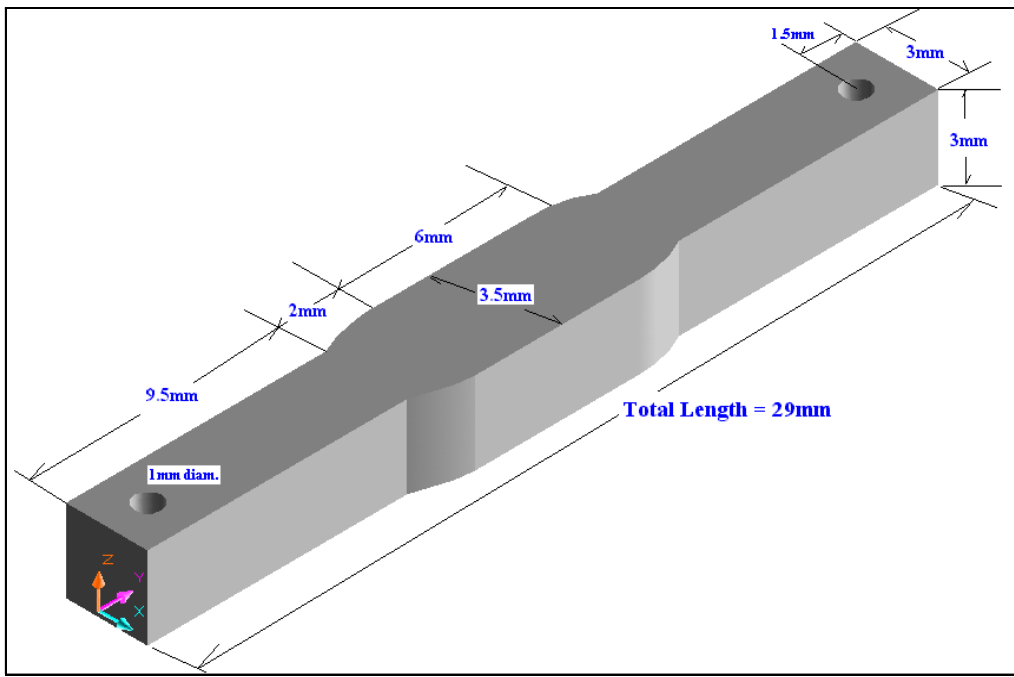
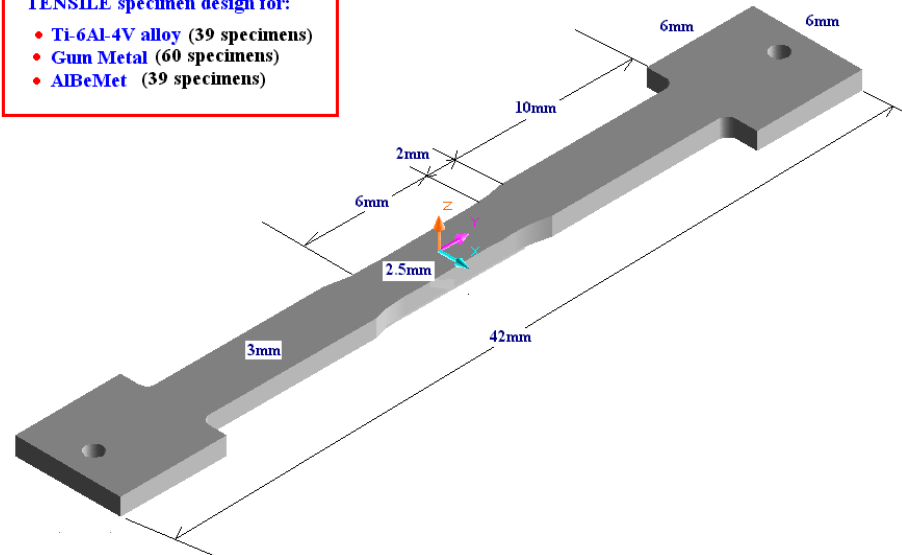
TARGET MATERIAL STUDY

- **Carbon-Carbon Composite (BNL)**
- **Toyota “Gum Metal” (KEK)**
- **Graphite (IG-43) (KEK)**
- **AlBeMet (BNL)**
- **Beryllium (BNL)**
- **Ti Alloy (6Al-4V) (SLAC)**
- **Vascomax (BNL)**
- **Nickel-Plated Alum. (BNL-FNAL-KEK)**

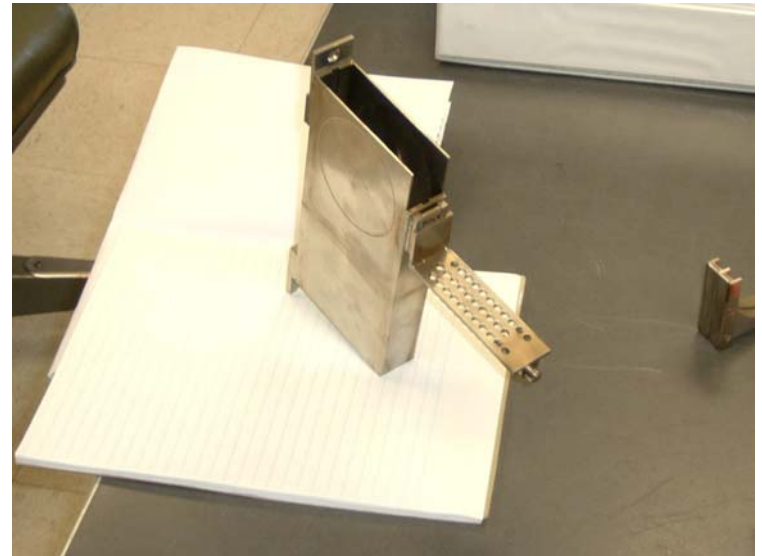
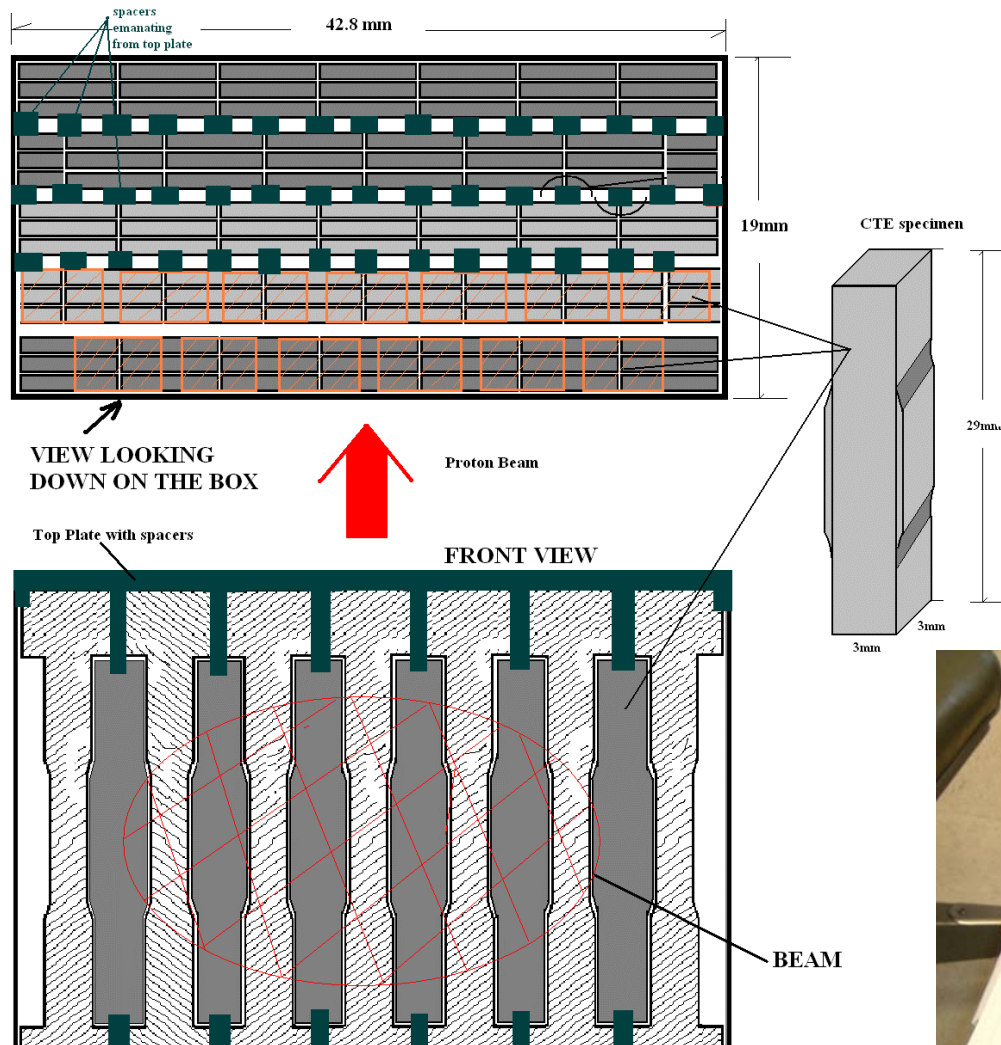
Tensile and CTE Specimen Design

TENSILE specimen design for:

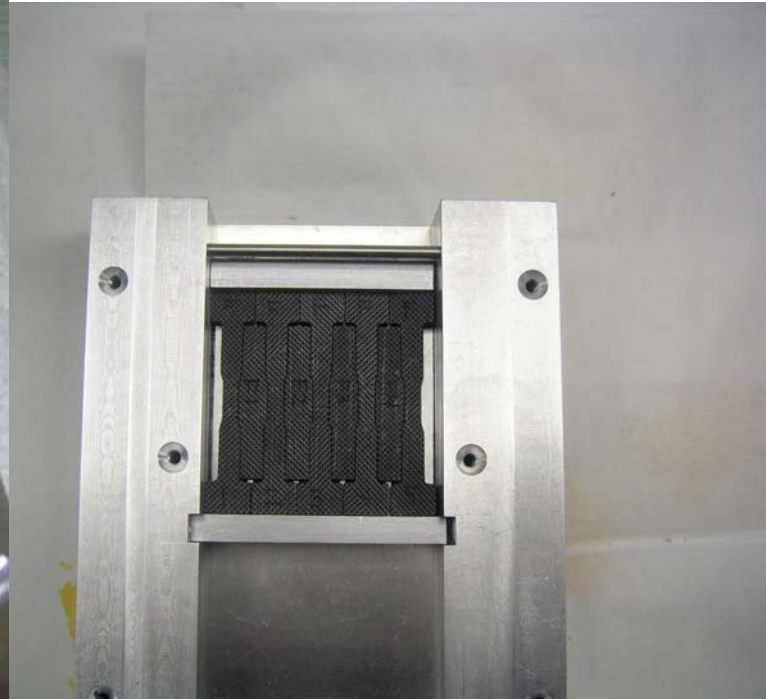
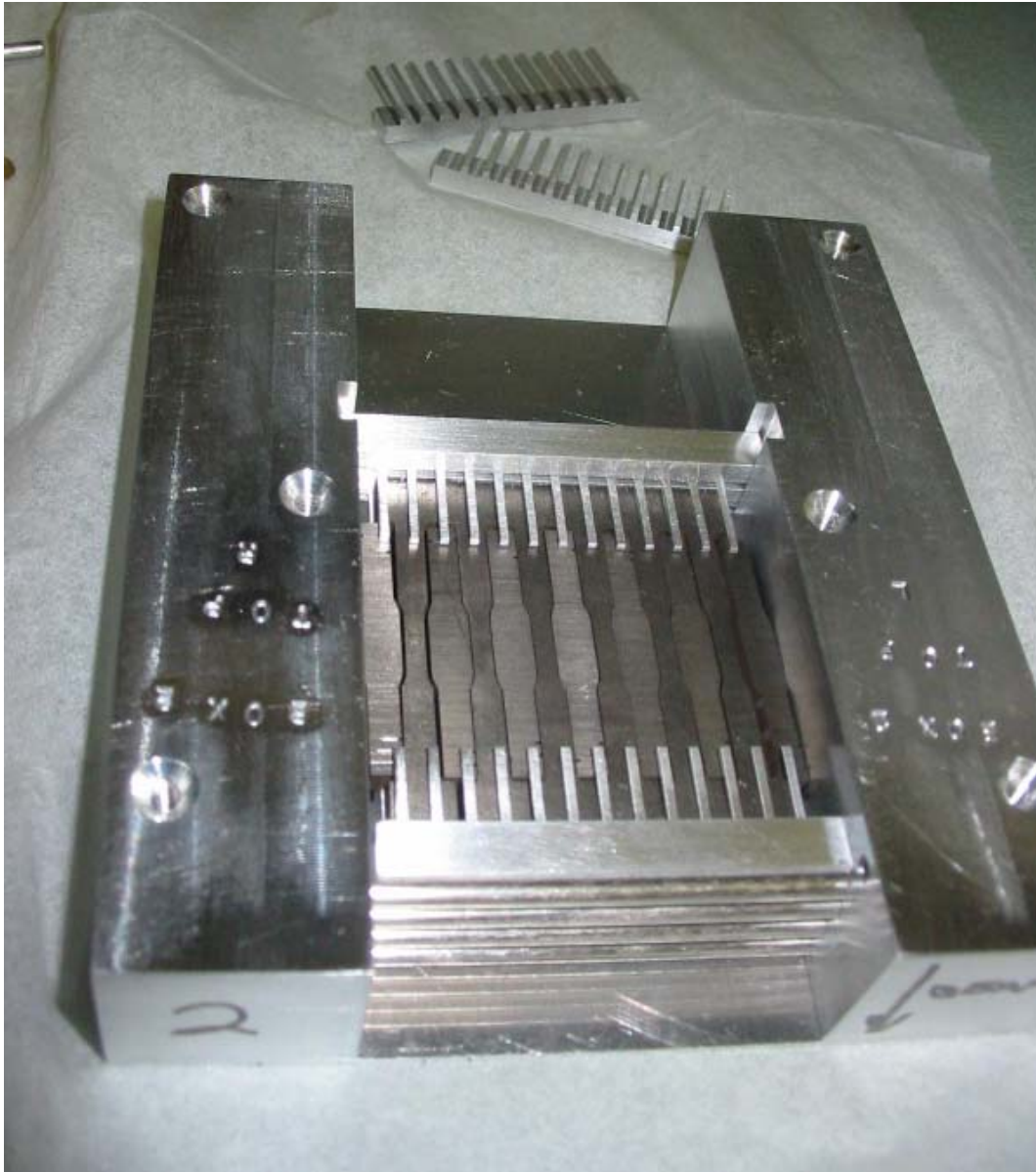
- Ti-6Al-4V alloy (39 specimens)
- Gun Metal (60 specimens)
- AlBeMet (39 specimens)

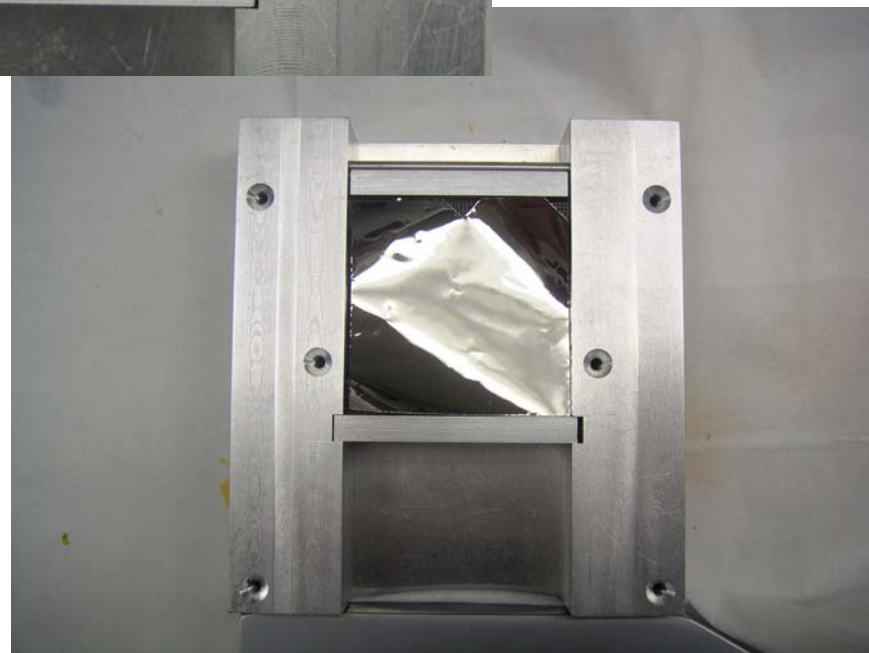
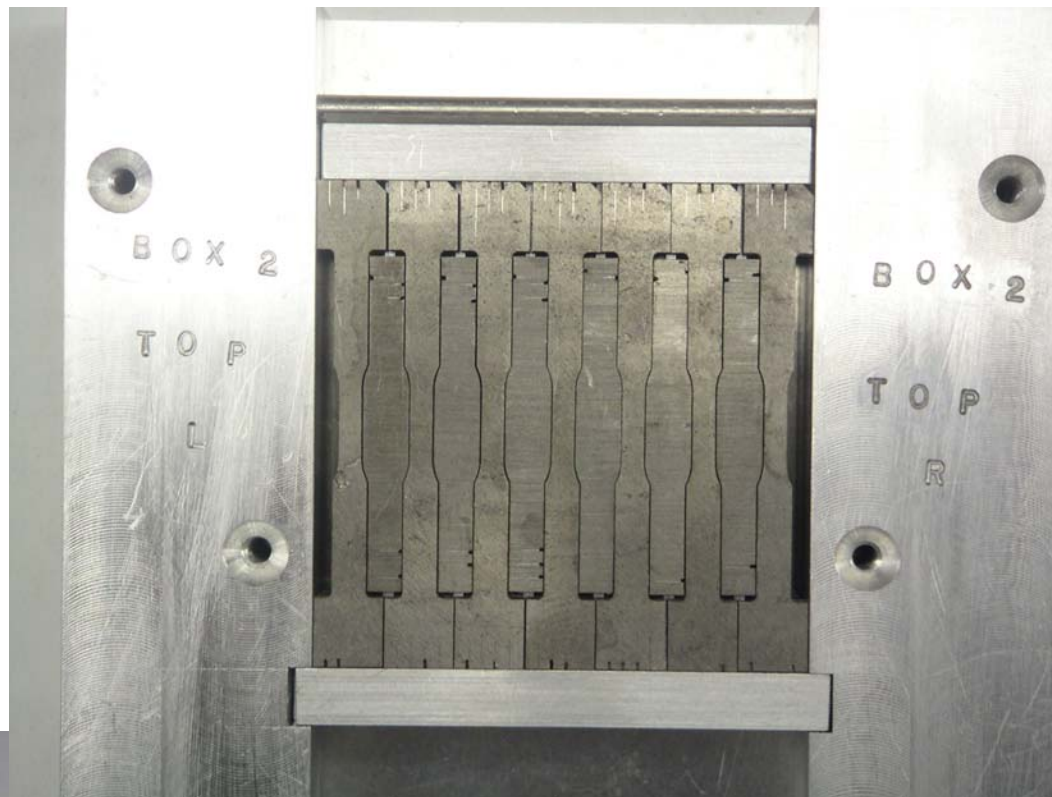


Tensile and CTE Specimen Assembly into the Target Box During Irradiation



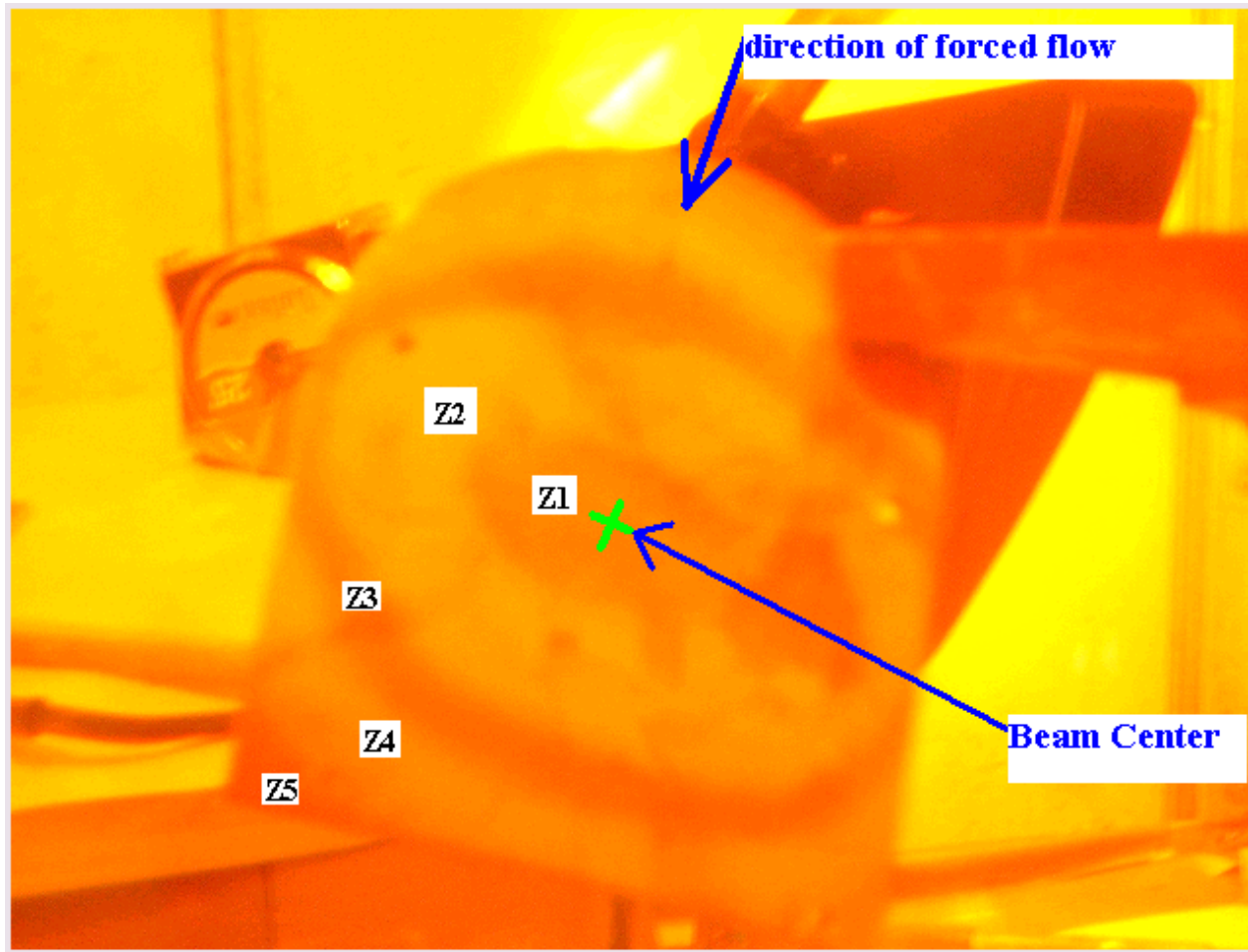
TARGET BOX ASSEMBLY DETAILS





Pre-TEST on Estimating Irradiation Temperature

Aluminum Plate



- Z1 = scorched zone
- Z2 = high temp zone where paint transitioned to light color again. Transitioning temp unknown
- Z3 = Zone where paint transitioned to original (tan) color. Transition occurs at 230 deg. C
- Z4 = Zone where paint transitioned from original color to next level. Transition at 160 deg. C.
- Z5 = Original color. Temperature in the range of 0-160 deg. C

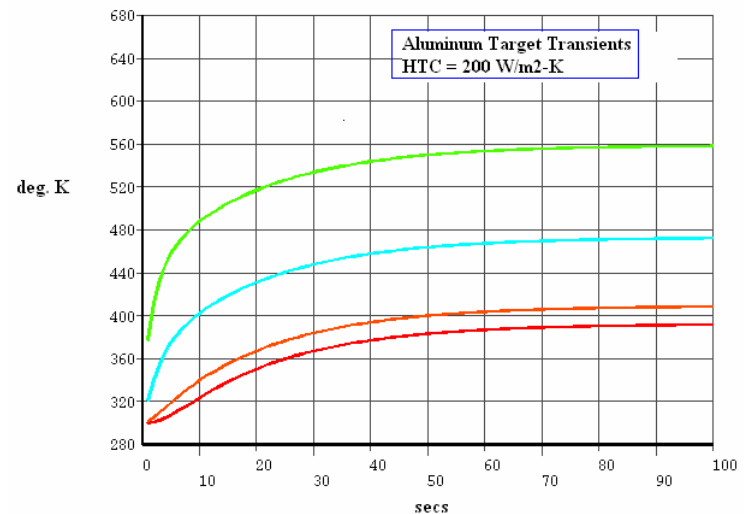
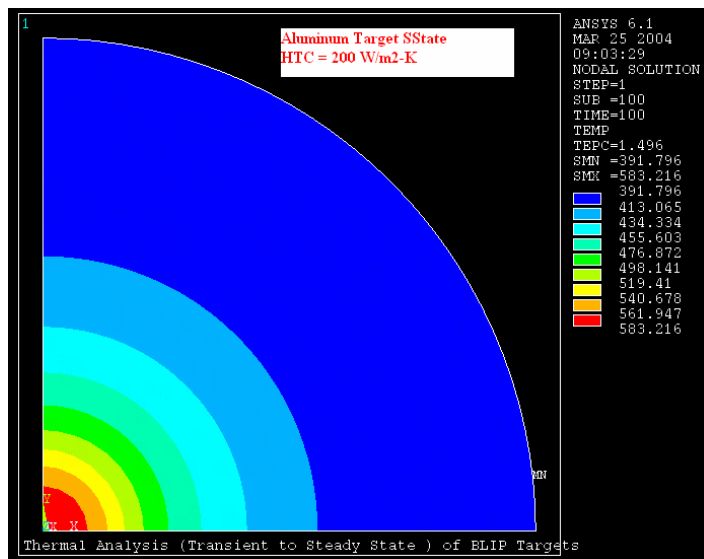
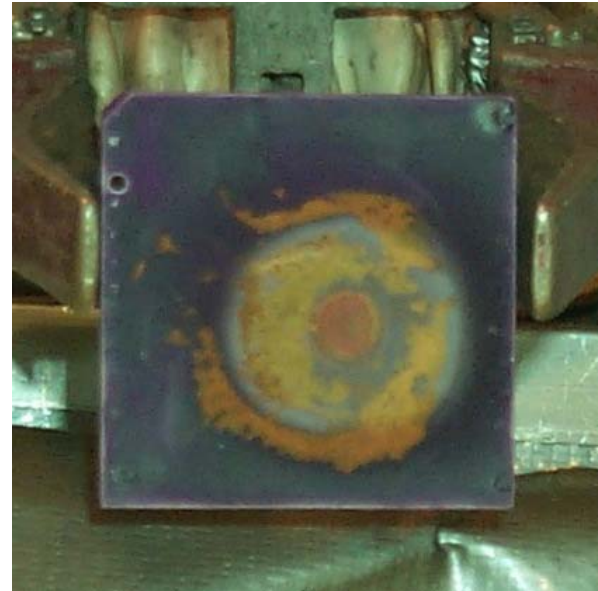
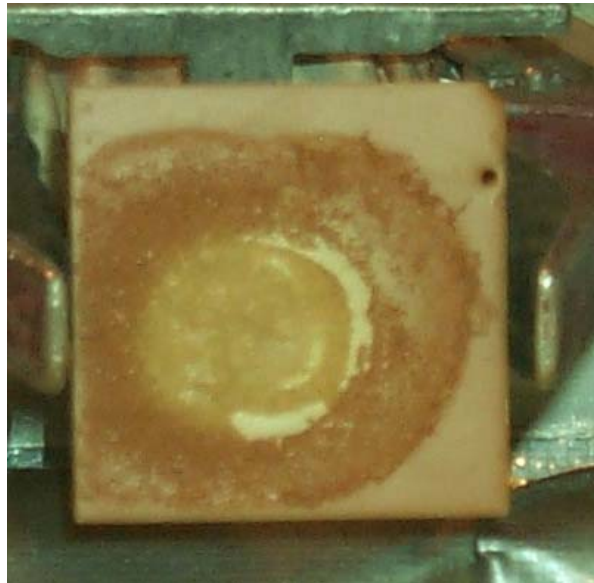


Irradiation Temperature Measurements – Follow-up

- **Use of IDENTICAL Target Assembly Structure in the beam**
- **Use PREPARED samples representing the thicknesses of the combined tensile/CTE targets**
- **Simulate the cooling channels as close-as-possible to actual Irradiation experiment**
- **Utilize a 2-color and 14-color TSP (one for each surface)**
- **Let system reach Steady-State and remove (minimize radiation effects on TSP)**

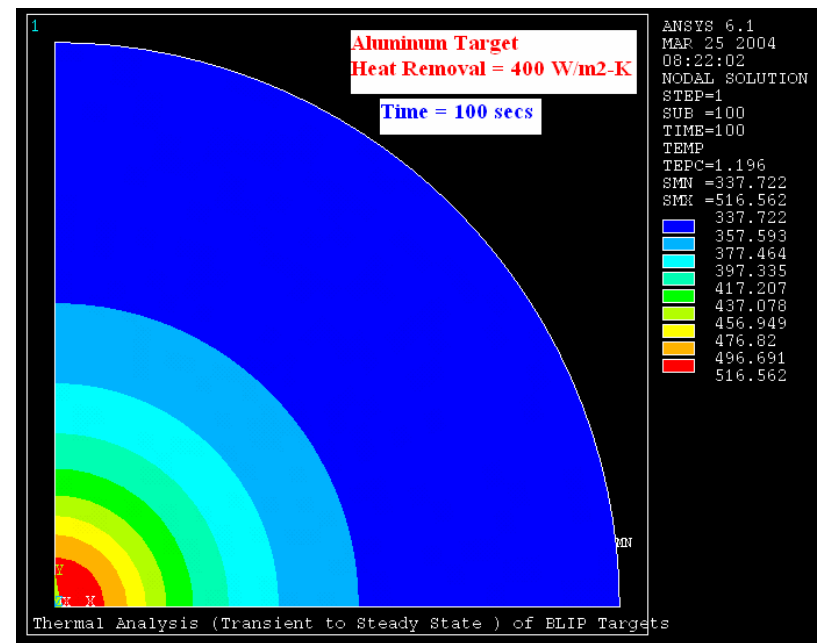
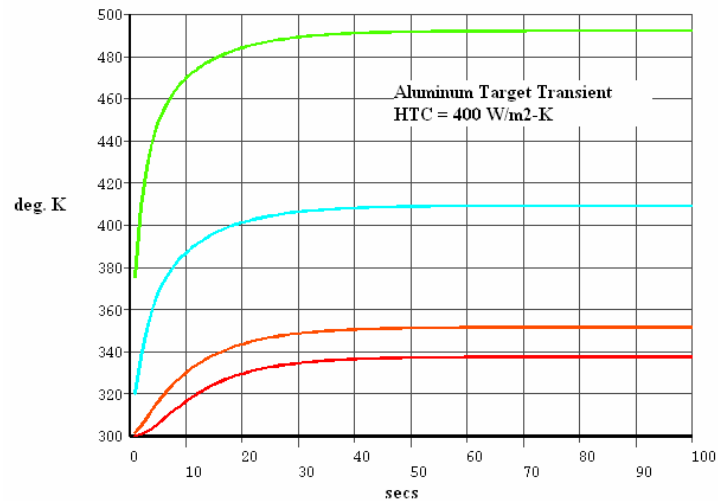
Actual TEST on Estimating Irradiation Temperature

Aluminum Plate



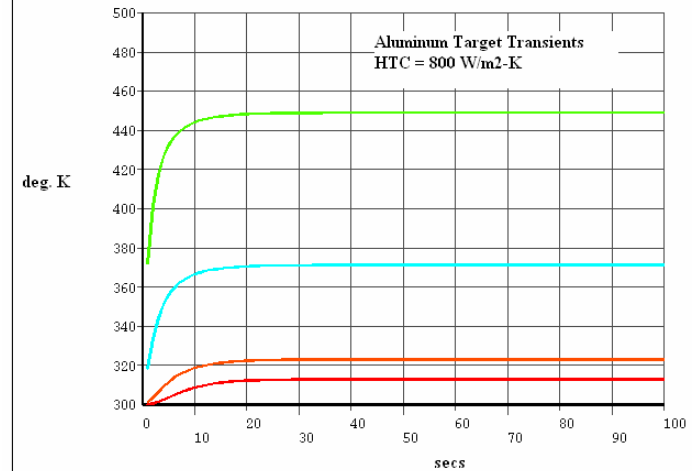
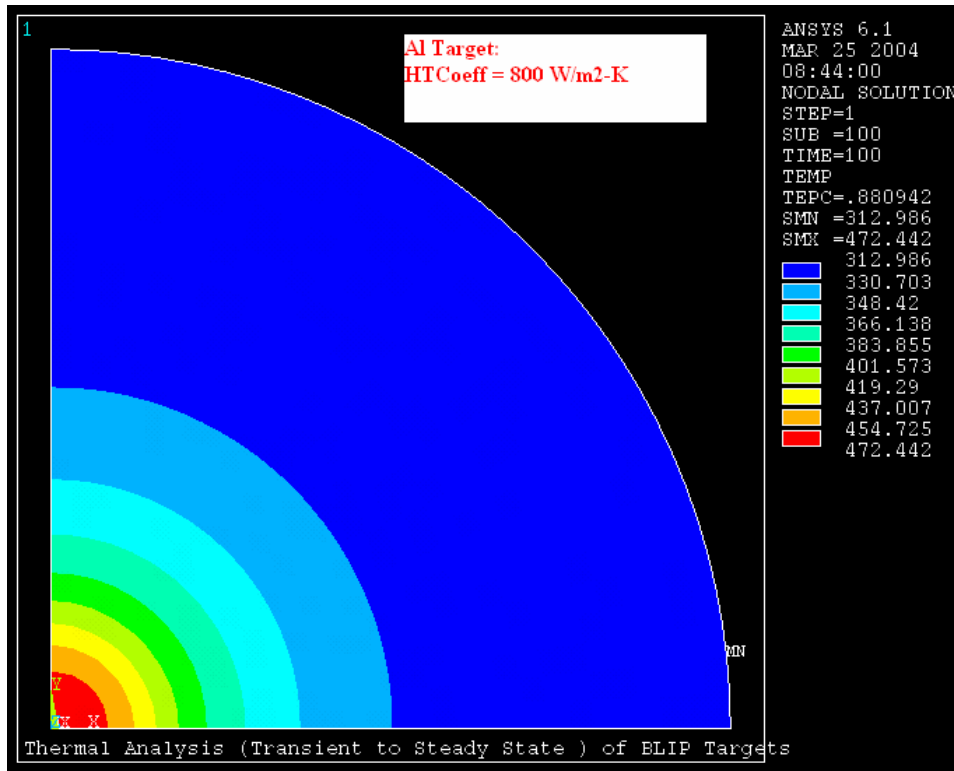
Actual TEST on Estimating Irradiation Temperature

Aluminum Plate



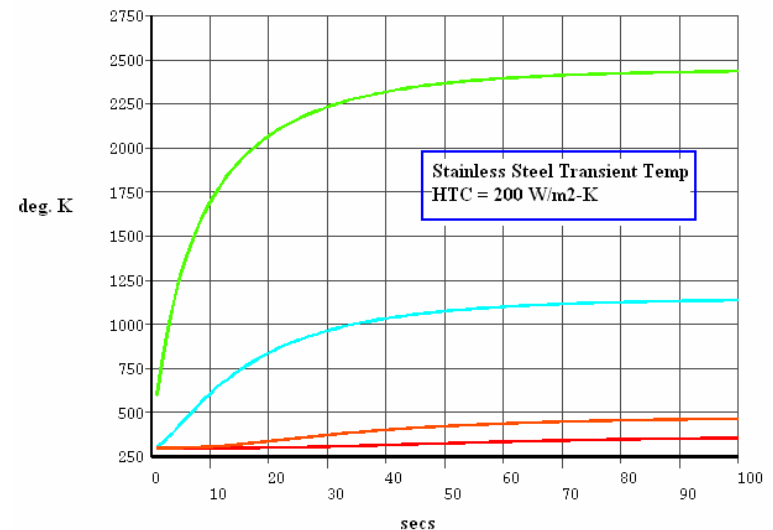
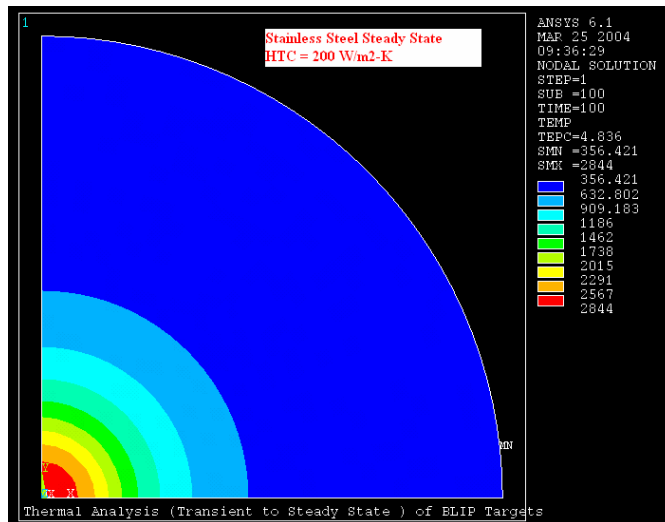
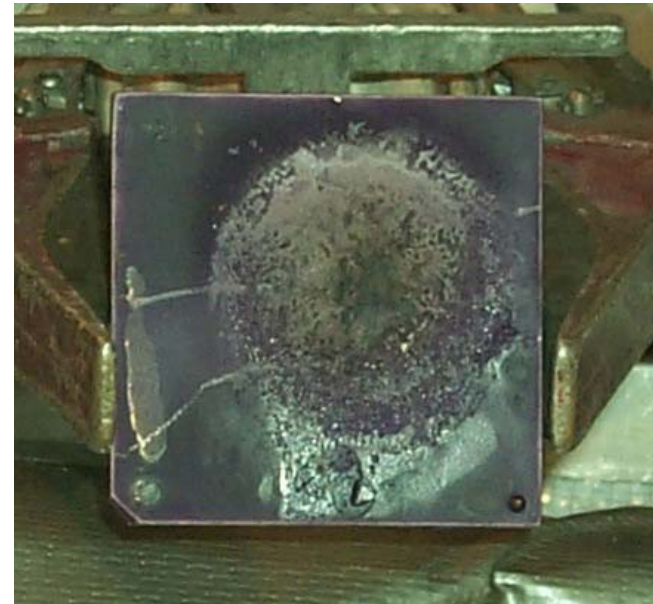
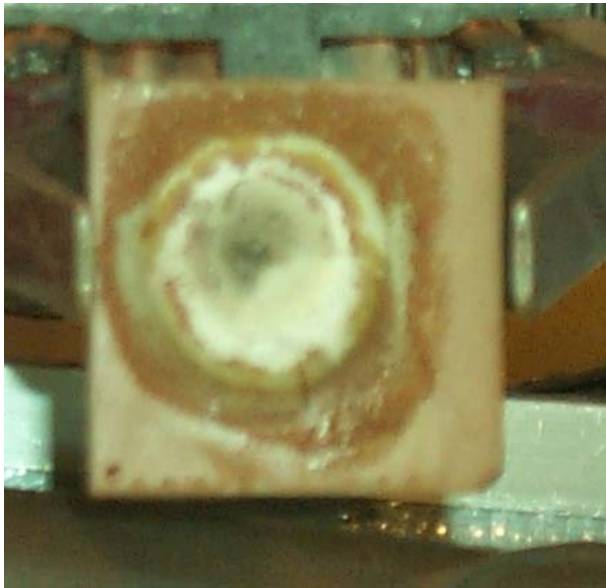
Actual TEST on Estimating Irradiation Temperature

Aluminum Plate



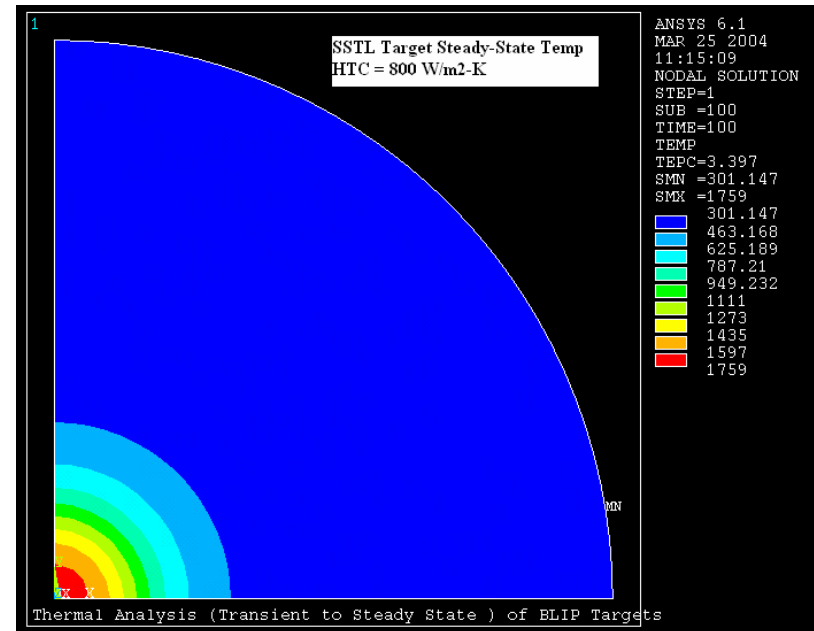
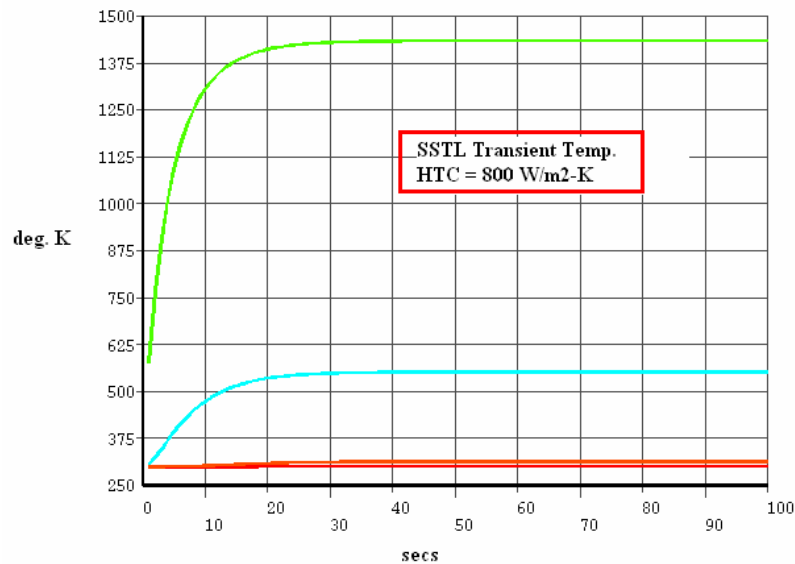
Thermal Analysis (Transient to Steady State) of ELIP Targets

Actual TEST on Estimating Irradiation Temperature Stainless Steel Plate



Actual TEST on Estimating Irradiation Temperature

Stainless Steel Plate



STATUS OF IRRADIATION EXPERIMENT

**IRRADIATION PHASE COMPLETED SUCCESSFULLY
on March 22nd**

**2-week irradiation of samples on 200 MeV beam with
average current ~ 80 μ A**

**Irradiation exposure expected to induce ~ 0.25 dpa on targets
(sufficient in revealing how materials are affected)**

Now, we sit-and-wait for the specimens to “cool-down”

And then, the real work begins

HOT CELL Specimen Analysis

